WHAT IS CLAIMED IS:

1. An optical communication system that compensates for polarization mode dispersion (PMD), comprising;

an optical source that transmits two or more optical signals having different optical frequency bands; and

a first optical compensator that receives the two or more optical signals and rotates at least one polarization state of the two or more optical signals based on an error condition to compensate for PMD.

2. The optical communication system of claim 1, further comprising:

a first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and

an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals;

wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changing the polarization state of rotation based on the error condition to compensate for PMD.

3. The optical communication system of claim 2, wherein the error condition is based on a number of bit-errors of the first received signal.

4. The optical communication system of claim 2, wherein the error condition is based on a failure of the first received signal.

5. The optical communication system of claim 2, wherein the error condition is based on a PMD measurement of the first received signal.

6. The optical communication system of claim 2, wherein the first optical compensator is a single rotation device that rotates the polarization state of each of the two or more optical signals.

7. The optical communication system of claim 2, wherein the first optical compensator includes at least two rotation devices that rotate the polarization state of each of the two or more optical signals along at least two axes.

8. The optical communication system of claim 7, wherein the at least two axes are substantially orthogonal.

9. The optical communication system of claim 2, wherein the first optical compensator comprises:

an optical splitter that receives the two or more optical signals and splits the two or more optical signals;

two or more polarization rotation devices that receive the two or more optical signals and wherein at least one polarization rotation device rotates the polarizartion angles of at least one optical signal; and

an optical combiner that receives the rotated optical signals, combines the optical signals and provides the combined rotated optical signals to the single optical conduit.

10. The optical communication system of claim 2, wherein the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio L_1 / L_2;

wherein L_1 / L_2 is less than approximately 1.5, and wherein L_1 is the length of a first optical conduit between the optical compensator and optical source, and L_2 is the length of the second optical conduit between the optical compensator and optical receiver.

11. The optical communication system of claim 10, wherein L_1 / L_2 is approximately $1.5 \geq (L_1 / L_2) \geq 0.25$.

12. The optical communication system of claim 11, wherein the ratio L_1 / L_2 is approximately 0.65.

13. The optical communication system of claim 2, wherein the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio $\overline{\Psi}_1 / \overline{\Psi}_2$;

wherein $\overline{\Psi}_1 / \overline{\Psi}_2$ less than approximately 1.2, and wherein $\overline{\Psi}_1$ is the average PMD of a first optical conduit between the optical compensator and optical source, and $\overline{\Psi}_2$ is the average PMD of the second optical conduit between the optical compensator and optical receiver.

14. The optical communication system of claim 13, wherein is $\overline{\Psi}_1 / \overline{\Psi}_2$ approximately $1.2 \geq (\overline{\Psi}_1 / \overline{\Psi}_2) \geq 0.5$.

15. The optical communication system of claim 14, wherein the ratio $\overline{\Psi}_1 / \overline{\Psi}_2$ is approximately 0.8.

16. The optical communication system of claim 2, further comprising at least a second optical compensator and a second optical conduit, wherein the second optical compensator receives the two or more optical signals from the optical source, second rotates the polarization state of at least one optical signal based on the error condition and provides the second rotated signals to a second optical conduit, and wherein the second optical conduit provides the two or more second rotated optical signals to the first optical compensator.

17. A method for compensating for polarization mode dispersion (PMD), comprising;

rotating the polarization states of one or more optical signals based on an error condition of at least one of the optical signals at an optical compensator; and

dispersing the rotated optical signals using a first birefringent optical conduit to compensate for PMD.

18. The method of claim 17, further comprising:

receiving the dispersed optical signals at an optical receiver;

measuring the error condition at the optical receiver; and

changing the polarization state of rotation at the optical compensator based on the error condition to compensate for PMD.

19. The method of claim 18, wherein the error condition is based on a number of bit-errors of the first received signal.

20. The method of claim 18, wherein the error condition is based on a failure of the first received signal.

21. The method of claim 18, wherein the error condition is based on a PMD measurement of the first received signal.

22. The method of claim 18, wherein the step of rotating includes rotating a polarization state of one or more optical signals about a single pre-determined axis.

23. The method of claim 18, wherein the step of rotating includes rotating a polarization state of one or more optical signals around two predetermined axes.

24. The method of claim 23, wherein the two predetermined axes are substantially orthogonal.

25. The method of claim 18, wherein the step of rotating comprises:

splitting at least two of the optical signals;

rotating the polarization states of at least one of the split optical signals; and

combining the split optical signals.

26. The method of claim 18, wherein the step of rotating occurs at a location between the optical source and the optical receiver and defined by the ratio L_1 / L_2;

wherein L_1 / L_2 is less than approximately 1.5, and wherein L_1 is the length of a first optical conduit between the optical compensator and optical source, and L_2 is the length of the second optical conduit between the optical compensator and optical receiver.

27. The method of claim 26, wherein L_1 / L_2 is approximately $1.5 \geq (L_1 / L_2) \geq 0.25$.

28. The method of claim 27, wherein the ratio L_1 / L_2 is approximately 0.65.

29. The method of claim 18, wherein the step of rotating occurs at a location between the optical source and the optical receiver and defined by the ratio $\overline{\Psi}_1 / \overline{\Psi}_2$;

wherein $\overline{\Psi}_1 / \overline{\Psi}_2$ less than approximately 1.2, and wherein $\overline{\Psi}_1$ is the average PMD of a first optical conduit between the optical compensator and optical source, and $\overline{\Psi}_2$ is the average PMD of the second optical conduit between the optical compensator and optical receiver.

30. The method of claim 29, wherein is $\overline{\Psi}_1 / \overline{\Psi}_2$ approximately $1.2 \geq (\overline{\Psi}_1 / \overline{\Psi}_2) \geq 0.5$.

31. The method of claim 30, wherein the ratio $\overline{\Psi}_1 / \overline{\Psi}_2$ is approximately 0.8.

32. The method of claim 18, wherein the step of rotating comprises:

first rotating the polarization states of the two or more optical signals received from the optical source using a first optical compensator;

second propagating the two or more first rotated optical signals using a second optical conduit;

second rotating the polarization states of the two or more optical signals received from second optical conduit using a second optical compensator, wherein the second optical compensator provides the two or more second rotated optical signals to the first optical conduit;